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METHOD AND ARRANGEMENT FOR THE REMOTE-CONTROLLED TESTING OF A SPECIMEN.

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is the US National Stage of International Application No. PCT/EP2003/005736, filed June 2, 2003 and claims the benefit thereof. The International Application claims the benefits of European application No. 02014157.8 filed June 25, 2002, both applications are incorporated by reference herein in their entirety.

FIELD OF THE INVENTION

[0002] The invention relates to a method for the remote-controlled testing of a specimen, with the data at the control unit and at the specimen being present in a format that corresponds to a transmission protocol used for the unsecured transmission of data. The invention furthermore relates to an arrangement for carrying out the method according to the invention.

BACKGROUND OF THE INVENTION

[0003] In contrast to previous practice, tests are nowadays frequently performed not on site, which is to say directly on a specimen, but from another location, which is to say under remote control. This involves the eventuality that data, in particular measurement results, may become corrupted on the transmission link between the control unit and specimen, especially when the data is transmitted in accordance with a transmission protocol used for the unsecured transmission of data. This means that a secured statement as to whether the measurement result reflects the actual situation on the specimen is not possible.

[0004] An example of a transmission protocol used for the unsecured transmission of data is the User Datagram Protocol, or UDP for short. UDP dispenses with error detection and correction, which is why processing of the data packets takes less time. A

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data packet also has a smaller header and hence a better useful data to packet length ratio.

[0005] UDP is thus better suited to applications that send short messages and repeat them in full when necessary, or to applications executed in realtime. The entire error-correction process therefore takes place within the application programs. This relates not only to bit errors but also to the total loss of the data packets, because routers will immediately reject UDP datagrams in the event of a high network load.

[0006] For the reasons cited, a complex method is required for securing the data within the control unit and specimen.

SUMMARY OF THE INVENTION

[0007] The object of the invention is therefore to disclose a method and an arrangement which will improve remote-controlled testing of a specimen.

[0008] Said object of the invention is achieved by means of a method
- wherein the data which, when transmitted, is present in the format corresponding to the transmission protocol used for the unsecured transmission of data is converted to a format corresponding to a transmission protocol used for the secured transmission of data,
- wherein the data is conveyed according to the transmission protocol used for the secured transmission of data, and
- wherein the data is converted back, prior to reception, to a format corresponding to the transmission protocol used for the unsecured transmission of data.

[0009] This on the one hand ensures the secured transmission of data at least link by link, on the other hand there is no need for separate securing on the part of the control unit or specimen. The control unit and specimen, both previously used for example in an unsecured data network, can therefore continue to be

used unchanged when the method according to the invention is ap-
plied. The secured transmission of data can thus be realized
with modest technical expenditure.

[0010] It is particularly advantageous
- if the User Datagram Protocol is provided as the transmission
  protocol used for the unsecured transmission of data,
- if the Transmission Control Protocol is provided as the
  transmission protocol used for the secured transmission of
  data,
- if the data which, when transmitted, is present in a format
  corresponding to the User Datagram Protocol is converted to a
  format corresponding to the Transmission Control Protocol,
- if the data is conveyed according to the Transmission Control
  Protocol, and
- if the data is converted back, prior to reception, to a for-
  mat corresponding to the User Datagram Protocol.

[0011] This variant of the invention employs means that are
tried-and-tested and standardized. The novel method can there-
fore be introduced in a particularly simple manner.

[0012] This is because the Transmission Control Protocol was
originally developed for transmitting data between Unix data
processing systems. A widely used protocol combination arose
there in conjunction with the Internet Protocol, or IP for
short. The two together also form the protocol basis of the
internet.

[0013] TCP is a connection-oriented transport protocol enabling a
logical full duplex point-to-point connection. It ensures that
data is transmitted error-free and in the required sequence. Any
faulty or lost data is re-requested from the sender.

[0014] Connections are set up and cleared down using three-way
handshaking during which protocol information for setting up and
clearing down the logical connection is exchanged between the

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sender and recipient. Errors are detected and, within limits, corrected.

[0015] It is also favorable if conversion from the unsecured to the secured transmission of data and vice versa takes place in a traffic reliabler device.

[0016] Use of the traffic reliabler device forms the basis for carrying out data conversion independently of the control unit and specimen. The remote arrangement allows the protocol-conversion mechanism to be introduced or, as the case may be, subsequently modified in a particularly simple manner.

[0017] A further favorable embodiment of the invention is pro-vided by a method wherein data which is present in the User Datagram Protocol is packed into a data packet according to the Transmission Control Protocol.

[0018] The data is here transferred unchanged from the User Data-gram Protocol to a packet using the Transmission Control Proto-col, meaning that the data is subsequently transmitted in tun-neled mode.

[0019] The object of the invention is furthermore achieved by means of an arrangement
- wherein arranged between the control unit and specimen are two modules for converting the data from a format correspond-ing to the transmission protocol used for the unsecured transmission of data to a format corresponding to a transmis-sion protocol used for the secured transmission of data, and vice versa, and
- wherein arranged between said two modules is a data transmis-sion line for transmitting data according to the transmission protocol used for the secured transmission of data.

[0020] The arrangement according to the invention ensures the se-cured transmission of data at least link by link. Moreover,

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there is no need for separate securing on the part of the con-
trol unit or specimen. The control unit and specimen, both pre-
viously used for example in an unsecured data network, can
therefore continue to be used unchanged when the method accord-
ing to the invention is applied. It is further noted that the
advantages cited in connection with the various variants of the
method according to the invention apply equally to the various
embodiments of the arrangement according to the invention.

[0021] It is also favorable
- if traffic reliabler devices are provided as modules,
- if two traffic reliabler devices are arranged between the
  control unit and specimen, and
- if a data transmission line for transmitting data according
  to the TCP is arranged between said two traffic reliabler de-
  vices.

[0022] A secured transmission of data is here achieved through
the use of standardized means. TCP is a widely used and acknowl-
edged protocol for the secured transmission of data.

[0023] It is furthermore advantageous if one traffic reliabler
device is arranged directly at the site of the control unit and
one such device is arranged directly at the site of the speci-
men.

[0024] Maximum transmission quality can be achieved by arranging
the traffic reliabler device in as close proximity as possible
to, respectively, the control unit and specimen. The traffic re-
liabler device can, however, also conceivably be integrated in
the control unit and/or specimen.

BRIEF DESCRIPTION OF THE DRAWING

[0025] The sole figure shows a control unit STR, a specimen PRÜ,
and a first and a second traffic reliabler device TRD1 and TRD2
respectively, with the control unit STR being connected to the
first traffic reliabler device TRD1, this being connected to the

second traffic reliabler device TRD2, and this being connected
to the specimen PRÜ.

DETAILED DESCRIPTION OF THE INVENTION

[0026] The invention is explained below in more detail with the
aid of an exemplary embodiment relating to the link-by-link
transmission of data between the control unit and specimen ac-
cording to the Transmission Control Protocol.

[0027] Figure 1 shows a control unit STR, a specimen PRÜ, and a
first and a second traffic reliabler device TRD1 and TRD2 re-
spectively, with the control unit STR being connected to the
first traffic reliabler device TRD1, this being connected to the
second traffic reliabler device TRD2, and this being connected
to the specimen PRÜ. Further indicated is the transmission pro-
tocol according to which data is transmitted between the indi-
vidual modules, which is to say using the User Datagram Protocol
UDP between the control unit STR and the first traffic reliabler
device TRD1, using the Transmission Control Protocol TCP between
the first traffic reliabler device TRD1 and the second traffic
reliabler device TRD2, and again using the User Datagram Proto-
col UDP between the second traffic reliabler device TRD2 and
specimen PRÜ.

[0028] The arrangement shown in Figure 1 operates as follows:

[0029] Data, which is to say control instructions, for instance,
which is sent from the control unit STR to the specimen PRÜ is
transmitted as far as the first traffic reliabler device TRD1
using the User Datagram Protocol UDP. Said data is there packed
into corresponding packets in keeping with the Transmission Con-
trol Protocol TCP and sent to the second traffic reliabler de-
vice TRD2. Transmission therefore takes place on this section in
a secured manner.

[0030] The packets are unpacked at the second traffic reliabler
device TRD2 and conveyed to the specimen PRÜ using the User

Datagram Protocol UDP. The control instruction, whose function
in the example shown is to initiate a measurement, is evaluated
in the specimen PRÜ. The relevant measurement is therefore sub-
sequently carried out and the measurement result sent back to
the control unit.

[0031] The data is hereby transmitted as far as the second traf-
fic reliabler device TRD2 using the User Datagram Protocol UDP,
packed there into corresponding packets in keeping with the
Transmission Control Protocol TCP, sent on to the first traffic
reliabler device TRD1, converted in the first traffic reliabler
device TRD1 to the User Datagram Protocol UDP, then conveyed to
the control unit STR in keeping with that protocol and displayed
there.

[0032] In this way it is ensured that the data is transmitted un-
changed on the section between the first traffic reliabler de-
vice TRD1 and the second traffic reliabler device TRD2 and that,
for example, the measurement results will not be corrupted.
Maximum transmission quality can be achieved by arranging the
first traffic reliabler device TRD1 in as close proximity as
possible to the control unit STR or, as the case may be, inte-
grating said device TRD1 in the control unit STR, and by arrang-
ing the second traffic reliabler device TRD2 in as close prox-
imity as possible to the specimen PRÜ or, as the case may be,
integrating said device TRD2 in the specimen PRÜ.